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INSECT INFESTATION ON THE WHITMAN NATIONAL FOREST

R.E. KAN SMITH
JULY 9, 1912

FILE COPY FOREST INSECT LABORATORY, STANFORD UNIVERSITY CALIFORNIA.

Smiths report 326.wh
and Ireland's letter

326.wh

SS
Whitman - Studies
Insect Infestation

R E P O R T

of the

PRESENT CONDITION

of

INSECT INFESTATION

on the

WHITMAN NATIONAL FOREST,

Oregon

by

R. E. KAN SMITH,

Forest Ranger.

July 9, 1912

The object of this report is to give a general idea of the effect of the 1911 insect-control work upon the Whitman National Forest, the present status of the infestation and the increase or decrease of their natural enemies.

The area covered includes the eastern border of the Forest from Wolf Creek, T. 5 S., R. 38 E., W. M., south to the summit of the divide, T. 9 S., R. 39 E., W. M., the tributaries of Cracker Creek between Sumpter and Bourne and north from Granite across the North Fork of the John Day River, including Trout Valley and Chicken Creek and Grande Ronde River, T. 6 S., R. 36 E., W. M. Observations on private lands adjoining the Forest were also made as occasion gave opportunity.

No intensive cruise was made of any of these areas, observations being confined to comparisons of infestations of the year with those of previous years or with trees treated in 1911. Sufficient counts were made to determine the approximate percentages and to check former knowledge of these infestations.

Generally speaking the infestation in yellow pine on the area treated in 1911 is as extensive as it was at the beginning of those operations. While there is often striking evidence of infestation from broods

that escaped destruction in that control work, yet in the time given to the study one is not justified in the conclusion that this new infestation did not come from areas outside adjoining, as much of it probably did. Because the areas worked were chosen in such a way that they were bordered on at least one side, and usually all sides, by untreated more or less infested areas from which the parent adults of the 1912 infestation could have come, and because of the fact that the worked areas do not as a rule exceed four or five miles in width - usually much less and even then with unworked somewhat infested areas adjoining all around - there is no means of determining distances that would aid in controlling insects by the limits of the attacking broods' ordinary flights.

It was commonly noted, however, that where new infestation occurred on the worked areas, the probable host trees from which the attacking broods may have come were found within a radius of 150 to 200 yards and often were adjoining trees, which from all possible evidences were infested in 1911. Occasionally it would be a tree infested 15 to 20 feet from the ground and out of reach of the cruisers and was thus passed up by them as their axe marks showed, and in some cases evidently the control work was carelessly done, as evidences of abundant infes-

tation by Dendroctonus were found above where the peeling was discontinued. In another instance of a tree cut for Dendroctonus brevicomis, the bark was peeled and piled preparatory for burning but was left unburned. Evidences of the maturing brood having emerged were found in the bark and hard by stood two trees of new infestation of Dendroctonus brevicomis.

Upon the area worked during the first half of the operation apparently no attempt was made at brush disposal, either on or off the National Forest. It is understood that brush disposal was forbidden by members of the Bureau of Entomology and that their instructions were later set aside by Forester's instructions, so that in the last half of the operation brush disposal was satisfactory on National Forest lands.

In several instances there were observations which would tend to indicate that as a rule they do not fly great distances ordinarily. One is an eminence to the north of Dutch Flat Creek, Section 12, unsurveyed T. 7 S., R. 37 E., W. M., from which a bird's-eye view of the mountain flats and slopes across the creek to the south is obtained. Here is seen the black-topped forest on the high lodgepole flats (5500 to 6500 feet) and slopes above them upon which the stand is an almost pure

mature lodgepole forest and which was almost completely infested about 1909 and was in the red-top stage at time of the examination and report in 1910. Below this type in the mixed conifers occupying the slopes just below the lodgepole flats is quite a distinct band of red-topped abandoned trees infested in 1911. This band of red-tops comprises practically all of the mature lodgepole in the stand. Still below this band of red-topped trees and in which yellow pine becomes prominent in mixture is a more or less irregular band of sorrel tops infested at present. In this lower band the infestation is heaviest next to the red-topped band and extends irregularly downward and into the area worked in 1911 and becomes scattered and spotted further on.

The whole distance from the heart of the 1909 infestation to the present infestation is possibly two miles. Evidently, however, it was checked by the control work in 1911 and has required a year to regain the ground lost to that work, as the infestation on the area is now approximately equal to that destroyed by the control work.

While the yellow pine of all ages is suffering heavily, the lodgepole is much more numerously attacked; in fact, practically all of the lodgepole above six inches D. B. H. is infested or killed. Thus it seems that in this locality, had last years' work been well followed up by similar work this spring, the beetles, having destroyed

the lodgepole, would have been so thoroughly reduced that here they would have been placed in the normal defensive position, in which, with very little aid, their natural enemies would have retained them. Of course this is assuming that the regions adjoining north and south had been brought under the same conditions.

Somewhat similar conditions of advance, though more extensive and less marked, are noted in the Grande Ronde Watershed, Ts. 5 and 6 S., Rs. 35 1/2 and 36 E., W. M. There has been no control work here, however, and the yellow pine, especially in the mixed conifer stands adjoining the lodgepole areas, is now suffering fully as badly as was the case in Powder Valley in 1909 and 1910, which so materially aided in impressing upon the private holders the thought of impending danger to their interests.

Another instance noted lies north and west of Sumpter. Here the situation may be described as follows: Conceiving the aggressive infestation as advancing southwesterly down the mountain sides from its strongholds in the lodgepole areas high up on the mountain and having reached Cracker Creek by 1911, then set back up the mountain on an average of three miles by the control work of 1910-11, taking refuge in areas untouched and trees overlooked by the control work and in the remaining live

trees in the area above. While after the passing of the control work, the beetles have reoccupied the territory from which they were destroyed in practically as aggressive an infestation as previously, they have not advanced beyond the creek to speak of, where the infestation has been reduced to normal by the control work of 1911.

One more instance will be cited, which is also of interest as to yellow pine reproduction. In Sections 8, 9, 16 and 17, T. 6 S., R. 38 E., W. M., is an area that was closely logged 30-35 years ago and much of it was never burned, the rest being burned soon after logging. It is now covered by a most excellent even-aged stand of yellow pine 20-30 years old and 10-20 feet high, averaging 20,000 to 30,000 per acre. It is very healthy and vigorous, growing rapidly. However, it is disheartening to note that fully 25% is either dead or dying from insect infestation, almost wholly Dendroctonus monticolae. The present infestation equals fully one-half of the dead and dying trees.

The method of attack is quite characteristic in reproduction. From a central clump of originally infested trees the infestation spreads in gradually widening concentric circles with each new infestation, until now these areas cover from one to many acres each, some

of the closer ones merging. From a point overlooking the area every spot of infestation is most easily picked out by the fading and black-topped colors.

The mature trees on the tract average three to five per acre and scattered here and there are black and broken tops, dead many years, that may be the clue to the origin of the present beetles. There are few mature trees infested at present.

As an illustration of a comparison of the present infestation with the control work of 1911 a cruise of two sections in the Deer Creek Watershed may be given as a good average of the area worked as a whole:

	Infested 1912.	Cut 1911 Control.
Section 28	16	32
" 32	49	23
	65	55
Average	32.5	27.5

From knowledge gained in the reconnaissance of 1910 and by observations and studies this spring, with general observations in the interim, somewhat different deductions from those of 1910 present themselves more and more forciably for consideration.

Previous Depredations.

1. Observations made during the past two years over all parts of the Forest lead to the conclusion that extensive infestations similar in extent and intensity to that of the present have at various times, with long in-

tervening intervals, visited the lodgepole pine forests. This is sustained by the constant presence of the markings of Dendroctonus monticolae on the surface of dead lodgepole, even to the last stages of decay; i. e., the longest dead trees

2. Many extensive lodgepole deadenings which in the past have been credited to fires are in reality due to the ravages of Dendroctonus monticolae, as the absence of indications of fires clearly shows in many instances; while in others, the almost entire absence of refuse on burned-over areas indicates a dead and highly inflammable condition of all material present at the time of the fire. Monticolae markings upon small portions of trees and charred remains that escaped the intensity of the conflagration point to the conditions previous to the fire. This is further supported by the observed actual exhibition in 1910 (Ladd Creek Fire) of what may occur under those conditions, a demonstration which is seldom, or never, equaled in similar living forests lacking large percentages of dead timber.

Wherever these large deadenings have occurred they have been replaced by dense even-aged pure stands of lodgepole growing up amid the tangled mass of fallen poles of the former stand, producing the most impassable areas of this region.

3. These infestations have been confined to lodgepole forests, or, if extending into yellow pine, only in mixed forests and then to scattered individuals or groups of trees, as is the case now along the western edge of Powder Valley and the Grande Ronde River. Evidences of very heavy attacks in pure yellow pine forests are lacking so far as observations have been carried.

4. These infestations after running their course, which may require many years, have waned until only a few scattered trees here and there throughout the forests are attacked from year to year, held in check by their natural enemies until such time as favorable conditions convene for their increase, when another extensive infestation takes place. As in the present case, so in the past, these attacks have covered immense areas. Whether their final reduction is due to an increase of their natural enemies, a developed inherent weakness, or an exhaustion of feeding grounds available in their line of advance would seem to be a question of much interest. The climatic conditions do not seem to have much direct bearing on the question of their growth.

The question of why lodgepole pine as a rule produces such small poles compared with that of Montana and the Rocky Mountains may possibly be answered by these depredations, as these seemingly have occurred about as

often as the lodgepole reaches the size most readily attacked, i. e. six inches D. B. H.

From the region covered it seems that the infestation has spread west and southward only slightly in the last two years as compared with accelerated advance of previous years. There is practically no advance from Bald Mountain, T. 8 S., R. 36 E., W. M., south and east beyond what it was in 1911. From this point northwest the advance has been only a few miles, seldom exceeding six, of the line drawn on map of report of 1910. However, that portion now in the Umatilla National Forest and the western part of this Forest have not been covered this spring and may modify the above statement.

Practically all the mature lodgepole pine within the 1910 infestation and 20% of yellow pine in the mixed forests on the headwaters of the Grande Ronde River is now infested or killed. Yellow pine along Sumpter Valley and the west side of Powder Valley is infested as much as in 1910, both that which was worked and which was not. The infestation in other portions of the Forest from what I have seen and heard is no worse than it was in 1910.

To ride through the lodgepole forests in the vicinity of Porcupine Ranger Station, T. 5 S., R. 37 E.,

W. M., that were infested in 1909-10 gives one the impression of an eastern hardwood forest in the dead of winter. The lodgepole all stands dead and bare, with here and there an occasional green tree of other species, such as larch, fir, etc. The earliest-attacked lodgepole is beginning to fall and it is only a matter of a short time when the great mass of it will fall.

While the infestation that occurred in the summer of 1911 appears to be as intensive and as widespread as the preceding years, yet close examinations show material decreases in the broods of this season. A small amount of this may be attributed to climate, such as excessive moisture accumulating under the bark of infested trees in some cases, to drying out in others. But the most apparent cause is disease and attacks by parasites and predators. Since the study of these falls within the province of the Bureau of Entomology, very little attempt was made to learn their nature. Their effects upon the broods were quite conspicuous though, and as a result of observations made it is evident that at least 50% of this year's broods has been destroyed by these means. Numerous counts of eggs hatched and larvae developed from individual egg galleries at various points visited give results of which the following are good averages:

15" D.B.H.	Lodgepole,	1	gallery,	56	hatch,	30 Developed
		1	"	97	"	46 "
20" "	Yel. Pine,	1	"	109	"	57 "
10" "	Lodgepole,	1	"	49	"	26 "

How many eggs were destroyed is unknown, although it is evident that many were. In those that hatched the larvae usually excavated mines or burrows 1-10 to 1-2 inch, occasionally reaching 1-1/2 and even 2 inches long before dying. However, those that excavated the long mines did not develop normally and in the end died apparently the same as those in the short mines. In these cases the shrunken and dessicated remains of the larvae were usually found at the outer terminals of the mines. Whether this is the result of disease or other cause is not known. This seems to be the most prolific cause of loss to the beetles. Next in effect is some cause that overtakes the larvae when 1/4 to 3/4 developed and usually nothing but the mine remains to indicate that the larvae has been, although occasionally indications of the larvae's dissolution are evident. Then next was a parasite very minute and visible only under a glass. It is apparently a maggot infesting and reducing the body of the larvae to a semiliquid mass and finally consuming all but the scales of the head. In a few cases these latter were observed attacking pupae in the early stages of their development. However, after reaching the pupal stage the beetle seems to be much freer of the diseases, etc. Quite often too the larvae mines and pupal cells even are filled with

white silky filaments probably the mycelium of some fungus. As this is also found enwrapping dead mature beetles it is thought that it may be responsible for some reductions of the beetle's forces.

Predatory and beneficial beetles and insects are much more numerous than was observed in 1910. It was thought that ants might prey upon the Dendroctonus but except as occasion offers access to the broods they can not effectively attack the mature beetles, since the beetles' hard covering shells furnish adequate protection from the bites of ants.

For some cause unascertained the work of woodpeckers so prominent in the summer of 1910 is now quite rare and scattered, although quite common in the winter and early spring. What little bird work was observed during this examination seemed to show that the birds were usually seeking mature beetles and in a few cases pupae of Ips and Dendroctonus, as well as grubs or flatheaded borers.

Dendroctonus brevicomis seems to be in normal or defensive position and losses from its attacks are only a small per cent of the total from infestation, but confined to yellow pine.

Dendroctonus valens was found flying as early as June 7 and vigorously attacking the base of yellow pine that was infested by other Dendroctonus species or had been windblown. Sound and healthy trees were not

found being attacked by Dendroctonus valens.

SUMMARY

Control Work 1911

Area almost as badly infested as at beginning of operation, but has been effective check, setting the infestation back fully one year.

Whether it would have been effective in checking an advance into uninfested territory could not be shown, owing to locations of areas worked.

Observations point to comparatively short flights of beetles (Dendroctonus monticolae) generally.

Work apparently often poorly done and only very small amount of brush disposal attempted on National Forest lands during the first half of operations and none at all on private lands.

Extensions of Attacks.

Limits of infestation have advanced only a few miles southwest in two years. Attack has increased to 20% of yellow pine in mixed stands on Grande Ronde River.

Sumpter Valley and west border of Powder Valley infested as bad as in 1910.

Reductions.

The beetles have at prior dates made similar inroads on lodgepole areas.

Deadenings in lodgepole pine forest often due to depredations of beetles rather than fires.

These infestations after running their course have waned with beetles on defensive in interims.

The infestations have not extended into pure stands of yellow pine, although serious in mixed stands.

The present infestation has reached its zenith and is now beginning to decline.

Natural enemies of Dendroctonus monticolae have greatly increased.

Respectfully submitted,

(signed) R. E. KAN SMITH

Forest Ranger.

Approved:

Supervisor

SS
Whitman-Studies,
Insect Infestation

August 8, 1912.

District Forester,

Portland, Oregon.

Dear Sir:

Reference is made to report of R. E. Kan Smith dated July 9, 1912:

I can not agree with Mr. Smith's report, especially that part beginning in line 6 on page 2 and including the remainder of the paragraph, which I believe in its present form is misleading. The areas treated in 1911 were bordered on one aide by heavily infested area, but the greater portion of the area could not be considered as being surrounded by infested areas, since with the exception of one side on the most of it and two sides on a small portion the infestation was not more than normal,-- a few scattering trees, about the same number that is found scattered throughout the entire timbered areas of this region.

The second paragraph on page 14 under summary refers to this subject again in a different form and I must disagree with the report for reasons stated above.

Under deductions, paragraph four on page 15, I can not agree with the statement that the infestations have not extended into pure stands of yellow pine. I have personally noted many places where the infestation was very heavy in pure stands of yellow pine; however, these infestations have not reached the larger pure stands, but occur in pure stands covering comparatively small areas within territory in which the north slopes are covered with a mixed forest.

Very truly yours,

(signed) Henry Ireland

Forest Supervisor.

WHITMAN NATIONAL FOREST, OREGON.

Extracts from Report of the Present Condition of Insect Infestation on the Whitman National Forest.

July 9, 1912.

by R. E. Kan Smith.

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p. 1

1. No intensive cruise was made (not over 8 days on the ground, other work also).
2. Infestation in yellow pine on the area treated in 1911, is as extensive as it (p.2) was at the beginning of those operations.

p. 2

3. There is often striking evidence of infestation from broods that escaped destruction in that control work.
4. Much of this new infestation probably came from adjoining outside areas.
5. The areas worked were chosen in such a way that they were bordered on at least one side, and usually all sides, by untreated or more or less infested areas. (Contradicted by For.Supr. H.Ireland's letter of Aug 8 to D.F.).
6. There is no means of determining distances that would aid in controlling insects by the limits of the attacking broods' ordinary flights.
7. Where new infestation occurred on the worked areas the probable host trees from which the attacking broods may have come were found within a radius of 150 to 200 yards.
8. Occasionally * * a tree infested 15 to 20 ft. from the ground was passed up by them (the cruisers).

p. 3

9. In some cases evidently the control work was poorly done as evidences of abundant infestation by Dendroctonus were found above where the peeling was discontinued.
10. * * brush disposal was forbidden by members of the Bureau of Entomology.
11. * * their instructions were later set aside by Forester's instructions.
12. * * observations * * tend to indicate that as a rule they (Dendroctonus presumably) do not fly great distances ordinarily.

p. 4

13. * * the infestation on the area (Dutch Flat Creek?) is now approximately equal to that destroyed by the control work.
14. The yellow pine of all ages is suffering heavily.

p. 5

15. * * in this locality, (Dutch Flat Creek?) had last years work been well followed up by similar work this spring, the beetles, having destroyed the lodgepole would have been so thoroughly reduced that here they would have been placed in the normal defensive position, in which, with very little aid, their natural enemies would have retained them * * assuming that the regions north and south had been brought under the same conditions.

p. 6

16. * * after * * the control work, the beetles have reoccupied the territory (Cracker Creek) from which they were destroyed in practically as aggressive an infestation as previously.

17. * * beyond the creek * * the infestation has been reduced to normal by the control work of 1911.
18. In Sects. 8, 9, 16 and 17, T 6 S, R 38 E, WM * * 20-30 year old yellow pine * * fully 25% is either dead or dying from insect infestation, almost wholly D. monticolae. The present infestation equals fully one half of the dead and dying trees.

p. 7

19. The mature trees on the tract average three to five per acre * * There are few mature trees infested at present.

Deer Creek	Infested 1912	Cut 1911 control
Section 28	16	32
" 32	49	23

p. 9

20. Evidences of very heavy attacks in pure yellow pine forests are lacking. (Denied in above letter to D.F.)
21. * * infestation, after running their course * * have waned * * * held in check by their natural enemies * * whether their final reduction is due to an increase of their natural enemies, a developed inherent weakness, or exhaustion of feeding grounds * * would seem to be a question of much interest. The climatic conditions do not seem to have much direct bearing on the question of their growth.

22. It seems that the infestation has spread west and southward only slightly in the last two years as compared with accelerated advance of previous years.

p. 11

23. Yellow pine along Sumpter Valley and the west side of Powder Valley is infested as much as in 1910, both that which was worked and which was not. The infestation in other portions of the Forest from what I have seen and heard is no worse than it was in 1910.
24. While the infestation that occurred in the summer of 1911 appears to be as intensive and as widespread as the preceding years, yet close examinations show material decrease in the broods of this season. A small amount (owing to) climate. * * But the most apparent cause is disease and attacks by parasites and predators.

p. 14 Summary

25. Area almost as badly infested as at beginning of operation, but has been effective check, setting the infestation back fully one year!!!
26. Whether it would have been effective in checking an advance into uninfested territory could not be shown, owing to locations of areas worked!!!
27. Observations point to comparatively short flights of D. monticolae generally.

p. 15

28. Work apparently often poorly done.
29. Attack has increased to 20% of yellow pine in mixed stands on Grande Ronde River.
    (p.5) There has been no control work here, however.
30. Sumpter Valley and west border of Powder Valley infested as bad as in 1910.
    (Edmonston's report - 1912 - shows a decrease in Silver Creek to Sumpter of 80 3/7% in Y.P. and 93 1/3% in Lp. P.)
31. The infestations have not extended into pure stands of yellow pine, although serious in mixed stands.
32. The present infestation has reached its zenith and is now beginning to decline.
33. Natural enemies of D. monticolae have greatly increased.

The cruise covered only, and that "not intensively" T 5 S, R 38 E south to T 9 S, R 39 E and T 6 S, R 36 E.

Comments.

How much time was spent on this cruise is not given, but records point to its having been done during the month of June, yet Edmonston, in his report, says this was a late spring by a month, snow until June - to the end of June in higher altitudes. Such is the report on an experimental control project carried out with the understood object of ascertaining the efficiency of artificial control and the correctness of a principle. Ostensibly the report was to have recorded facts for conclusions as to the result of the project, but evidently the avowed purpose here was to prove a priori negative results. As facts to substantiate such preconceived results were not available, the author plunges into speculation on relevant and irrelevant subjects and lands nowhere. There is no more evidence to show the operation was unsuccessful than that it was - there is no evidence. But there is theory and speculation a plenty, nor are these confined to the state of the forest. With Edmonston's 1912 most systematic, business-like, truly scientific report it can only be compared by contrast. The one is replete with statistics of trees infested prior to operation, trees treated and trees now infested, percentages, etc. etc. covering the entire area; Smith's report is a jumble of distant views, hearsay, speculations on insect mortality and flight, with not enough data on which to hang a shadow, to say nothing of profound theory.

Compiled Branch of Forest Insects
Mar 21/14.

Comments on numbered statements, extracts from report of Ranger Smith, Whitman National Forest, Oregon, on condition of insect infestation, July 9, 1912.

By W. D. Edmonston, Colorado Springs, Colo., March 30, 1914.

p. 1

1. On May 31, 1912, at Portland, Oregon, George H. Cecil, District Forester, informed me that Ranger Smith would make the examination of the areas for the Forest Service.

On June 6th Supervisor Henry Ireland advised me that Smith was over in the North Powder country and that he had instructed him to ride over some of the camp areas and take a look around and ascertain what he could about the conditions.

Smith was away about a week on this trip but the examination was only an incident on the trip.

On June 22 I wrote Smith through Supr. Ireland enclosing copy of the "General instructions for inspection of the areas covered by the project, along with copy of the "Special Instructions" dated June 18, 1912. No reply was received. Smith at the most could not have spent over 8 days looking over the ground, and as has been stated he had other work to attend to.

2. We will take the area that Smith calls "Dutch Flat Creek"; on the project this was called "Bulger Flat Camp area No. 2". In speaking of this area he states: "the infestation is approximately equal to that destroyed by the control work". What are the actual facts: The area covered 3,360 acres. (Smith states he got a "birdseye view" of this area "from an eminence to the north of Dutch Flat Creek, section 12, T 7 S, R 37 E, WM". He was then at the extreme western edge of this control area; he had three miles east to cover with his eye and the same distance south; he could tell nothing from that distance and his report shows that he was away off in the impression he formed). 732 yellow pine, aver. diam. 20", were found infested on this area in 1911, of these 428 were cut and treated, or 59% of the infestation. In the cruise of 1912, 236 yellow pine were found infested, aver. diam. 20", a reduction of 44½% compared with the number treated and a reduction over all of 67%.

The next camp area south (North Powder River Camp #5) shows a reduction in the infestation in 1912 of 73 7/9%. The difference between the infestation of 1911 and that of 1912 on this camp area was 1,222 trees less in 1912; this cannot be considered in the light of an approximate equality, even a birdseye view would show this marked reduction.

3. Possibly that is true, but what about all beneficial agents taken into consideration in the control plans although destroyed to some extent on the national forest by the "brush burning" orders issued by the Supervisor on May 5.

4. Possibly in a few cases. My report which gives accurate figures based on actual counts does not substantiate this statement.

5. This statement is true up to a certain point if the insipid infestation in the sapling and small tree growth is considered. The intention was not to exterminate the insect but to reduce it to a point where natural agencies could still further reduce it. It was unnecessary to cut and treat isolated patches of infested young trees, more especially when it had been ascertained by Dr. A. D. Hopkins on March 28, 1911, by examination on this very area that the brood in the sapling and small tree growth was diseased and heavily parasitized. One 20" diameter tree with a healthy brood would equal 200 to 300 of those saplings. District Forester George H. Cecil when he visited some of the camps on May 28 or about that time instructed the crew and camp foreman to burn up all yellow pine (infested) below 12" in diameter; later he modified this order to 10"; when this was brought to my attention I instructed the cruisers not to mark for cutting anything below 10" and the crew foreman not to burn anything above that diameter.

In choosing the areas, we were to a certain extent compelled to select on the east and south the areas we did, as we were confined to the national forest areas, while later instructions allowed us to cut off the forest it was expected and understood that the work should be divided between the public and private lands. To comply with this order and still get results we followed the forest boundary covering about the same amount of ground on the forest as off; this left some strips east of our east boundary line that did contain more or less infestation. For a number of reasons we cut very heavily in some areas and less in others. As the snow melted we were able to push further into the forest. At the close of the project we had done just about the same amount of work on the national forest as we had off and the infestation left east of the line was not of much importance. Smith then is correct and Ireland wrong.

6. From the results ascertained from insect control work since 1906 to date in Colorado and Oregon, it would appear that by treating 60 to 70 percent of the infestation in the principal areas and large patches that by at least the second season and in some cases the first the infestation has been placed under complete control. The distances that tree killing insects fly does not seem to have any bearing on control work. What does have a bearing is to have a proper knowledge of the methods of control and do the work.

7. Not over 55% to 65% of the infested yellow pine was treated on the areas covered by the project in 1911, yet the infestation was reduced at the least calculation 85% in 1912. In 1913 there was less infestation on the control areas than is to be met with on other parts of the forest which are supposed to be free from infestation.

8. See answer to No. 5

p. 3.

9. See answer to No. 5

10. Brush disposal was not forbidden by members of the Bureau of Entomology. The Forest Service was at liberty to do as they pleased about the brush. They were told from the beginning that they could have all the crews they wished to follow up the cutters and treatment crews and pile and burn brush; we only objected to burning the bark.

11. On May 5, 1911 when the camps were working smoothly and we had ascertained by actual trial that the most mobile and efficient camp was the limit of 14 men, Mr. Ireland issued an order to all crew foremen that the brush must be piled and burned on national forest lands, the result being that from 3 to 5 men were added to each camp; the cooks had to have an assistant, more equipment was needed, and the camp foreman unable to keep in touch with the work. There was a noticeable slowing up of the work after May 5. It was supposed that one man could take care of the brush of two treatment crews but they could not do it; it ended by the treatment crews in many of the camps having to pile their own brush. These additional brush pilers and burners did not add one square foot of infested bark to the sum total treated.

12. I cannot answer that as I don't know.

p. 4

13. See answer to No. 2

14. Not as much by 85% in 1912.

p. 5

15. This was not necessary in the areas mentioned as the examination made in 1913 shows that on the treated areas and for some distance two to four miles from the treated areas they are in the so called "normal defensive position".

p. 6

16. The infestation on the "Cracker Creek camp area" was reduced 80½%, 1,005 lodgepole pine were treated in 1911. In 1912, 95 were found infested.

17. Yes it has, if the word normal is proper where timber is dying from the attack of insects.

18. This area mentioned by Smith is east of the treated area, no infested trees were cut on the sections named. No time was spent in treating small trees. See answer to No. 5.

p. 7

19. Only small stuff was infested and in 1913 it had run its course which was to be expected. Ranger Parker owned at least 200 acres of this land that Smith mentions and it was up to him to treat the trees if he wished to save the young growth.

p. 9

20. If the timber on the divide between Burnt River and the Sumpter valley is not a pure stand of yellow pine then there is none in that section of the country. It is a very fair average for most of the timber areas in northeastern Oregon. I may say that on the "Cold Springs Camp #7" timber owned by the Oregon Lbr. Co. and the Wallowa Timber Co., 1,889 yellow pine trees were cut and treated in 1911; the reduction on this area in 1912 was 84 1/11%. Evidence of heavy attack in pure lodgepole forests is not lacking.

21. It does not seem that this requires any answer. It will be very interesting indeed to know when insects stop killing trees in the Whitman Forest.

22. The infestation has spread from small centers on the west which in 1910 were far in advance of the main infestation; it has spread north from what was the main western edge of the heavy infestation noted in 1911, and it has apread 12 miles north in two years. The infestation in the lodgepole pine at the present time where it has spread over into the Umatilla N. F. is as heavy now as it was in the Northeastern portion of the Whitman in 1909-10. From approximately the Grande Ronde River at the Sheep Ranch due west for 20 miles and perhaps further, and at least 6 miles wide the infestation in both lodgepole and yellow pine is just as heavy now as it was east of the Sheep Ranch in 1910. Where Smith has made a mistake was in supposing that the infestation was just as heavy in the lodgepole pine in 1910 in that 20 miles of country west of the Sheep Ranch (Hidaway Springs, Fly Valley and Lehman Springs, all within the Umatilla N.F.) when the actual truth is the infestation, while it was present in that country, was as nothing compared to what it is now. It has not only increased in volume but it made an advance of at least 12 miles in the past two years. If you can consider it in the light of an advance where there was already small centers of infestation from which it could have built up and spread, true there could be an overlapping of the very heavy infestation spreading fan-shaped-wise and covering westward areas of general infestation long established but under a natural control up to 1906 or 1908.

p. 11

23. A count made in treated areas (Cold Springs and Sheep Rock) on the south side of Powder Valley (see answer to No. 20) show that the infestation has been reduced 61½% at Sheep Rock and 84% at Cold Springs - from report of 1912 cruise. The infestation in the Sumpter Valley was less by 918 yellow pine trees in 1912 than in 1911. Where no work was done there was a decided increase. The infestation is worse in some portions of the forest untreated than it was in 1910. The infestation

from Anthony Lake northwest to the Sheep Ranch and from the Sheep Ranch west to Hidaway Springs is more severe than it has ever been since 1909. (See report by Entomological Ranger George Hofer on cruise of Whitman areas, August 1913).

24. This is answered.

p. 14

25. This is quite true of the non-treated areas. On the treated areas there is a reduction of the infestation of 85% in 1912, and 1913 report shows that the infestation has been reduced to very much below what is termed normal, furthermore the infestation on the borders of the treated areas from two to four miles has been reduced which is not the case anywhere else on the forest.

26. It has not advanced south from the treated areas or adjacent non-treated areas south of the Powder Valley, but it has advanced west from the non-treated areas and overlapped already areas infested to some extent from the Whitman N.F. over into the Umatilla N.F. and has heavily infested an area seven miles wide and 14 miles long.

27. As this statement is not supported by the evidence on which the observations were made it is of no value so far as any answer I could make to it.

p. 15

28. We cared nothing for appearances, results in insect control work is what counts. We got results. Brush piling and burning, peeling tops, large limbs, etc., when the main object is to get the bark off the main trunks is a waste of time and slows up the work which must be finished at a stated time. Along the borders of the Whitman N.F. we covered an area the exterior boundary of which was 54 miles and the interior boundary at least 40 miles; the average width of this area was in excess of 3 miles. This area does not include nearly 16,000 acres on the south side of the Powder River Valley, private holdings four miles from the nearest point treated bordering the national forest boundary. I wonder how far we would have got had we had to pile and burn and treat all the tops, lops and small diseased saplings on an area of this magnitude. If the Forest Service had a burn covering as large an area as this, would they go over the area after the fire and pile all the brush of the green trees that fell during and after the fire. Do they pile the brush in the large or for that matter small wind falls. I would like to hear of one case in Oregon where they have done this.

29. This is true on the Grande Ronde River areas which are situated 10 miles northwest of the treated areas. It is not true of other sections of the forest, except in the lodgepole pine from 4 to 8 miles from treated areas.

30. Answered in No. 23.

31. See answer to No. 20.

32. See answer to No. 22. Heavy infestation will be found in the Whitman and Umatilla National Forests for many years to come. They had better take a look at the white-bark-pine and lodgepole areas on the old Sheep drive-way between Chicken Hill and Woodley.

33. They have on the east side of the North Powder Peaks but not on the west side from what I could judge by very careful examinations on areas near Hidaway Springs and other points between there and the North Powder Peaks.

W. D. EDMONSTON
Southern Rocky Mountain Station,
Colorado Springs, Colo.

Summary of Mr. Edmonston's Report on Inspection of Northeastern Oregon Demonstration Project 38 of the Branch of Forest Insects, Bureau of Entomology.

The work on this project was carried on in cooperation with the Forest Service and private owners, from May 15 to December 31, 1910, and April 5 to June 29, 1911, in which the Bureau of Entomology made the investigations, recommended the methods, and gave instructions. The Forest Service and private owners furnished the money and men for cutting and barking the infested trees.

Investigations conducted in 1907 and 1910 to determine the conditions in the Whitman National Forest, the Wallowa National Forest, and adjacent areas, representing a timbered area of over 1,500,000 acres showed that extensive depredations by the mountain pine beetle had been going on in this area since 1905. It was estimated that 35% of the lodgepole pine on about 1,000,000 acres and 50% of the matured lodgepole pine on 800,000 acres of the same area had been killed, or a total of over 8,000,000 trees. It was also estimated that 140,000 yellow pine trees had been killed by the beetle.

The area involved in the control project included the eastern and southeastern borders of the Whitman National Forest and adjacent and nearby private lands, comprising 76,430 acres of the national forest, and 11,520 acres of privately owned land, making a total of 87,950 acres. The control work was started in the fall of 1910 and completed June 30, 1911.

The total number of yellow pine and lodgepole pine trees treated on the national forest and adjacent lands was 28,489, at a total cost for equipments and labor of $30,000. The number of trees treated on the private lands was 5992, at a cost of $2,000, making a total cost of $32,000.

In order to determine the results of this work, a very thorough inspection of the treated and adjacent untreated areas on the Whitman and adjacent, and on the untreated check area of the southern section of the Wallowa National Forest and adjacent, was carried on by four representatives of the Bureau of Entomology during the months of May to September, 1912. Each of the twenty-six cooperative camp areas and the areas treated by the private owners was studied in great detail to determine:

(1) The number of infested trees treated in 1910 and 1911.
(2) The number of infested trees left untreated in 1911.
(3) The number of trees infested in 1912.

The results show that within the treated area there were 37,178 trees killed by the insects in 1910 and 1911, that there were 2688 trees left untreated, and that only 4698 trees were killed within the same area in the 1911 and 1912 infestation - a reduction of 32,480 trees.

A check area of yellow pine south of the Whitman, which is some distance from the treated area, showed an increase of over 240% in number of newly infested trees over that of the preceding year.

The Wallowa check area shows approximately the same amount of infestation for 1911 and 1912 as in the preceding years of 1910 and 1911.

Therefore, it would appear that the demonstration was a success in showing that -

(1) Under unfavorable conditions of a well-established and widespread infestation, it is possible and practicable to treat a small part of such an area and not only reduce the loss 80% or more within the treated area, but protect large bodies of adjacent healthy timber.

(2) This demonstration, together with the many other successful ones conducted during the past five years, prove conclusively that a large percentage of the enormous annual waste of forest resources caused by Dendroctonus beetles can be prevented, and

(3) The direct cost of such protection comes within the range of profitable business management.

January 8/13.

(By A.D.H.)

Northeastern Oregon Project.

Reconnaissance Report, Season of 1913.

Umatilla and Whitman National Forests.

by

George B. Hofer, Agent.

The territory covered in this examination lies between Albee, Oregon, and a point 10 miles west of North Powder, Ore. All travel was done on foot, both going and coming. Infestation in the large bodies of yellow pine surrounding Albee, Oregon, was very slight. On Camas Creek 10 miles east of Albee the infestation showed a decided increase, clumps of yellow pine and lodgepole were noted to be infested, on Hidaway Creek. 4 miles east of Camas Creek, larger clumps of infested trees, especially lodgepole pine were noted. Five years ago I was staying at Hidaway Springs which is on the Northwestern edge of the Whitman National Forest. At that time I did not notice anything out of the ordinary in the surrounding forested areas. I admit that at that time I only had a slight knowledge of the work of insects, but am a close observer and have lived in that part of the country for 16 years. As we continued on our way east, over a long low timbered ridge for 16 miles, between Hidaway Springs and Fly Valley Ranch, in the yellow pine and lodgepole pine we observed large clumps of dead and dying trees, continuing from Fly Valley 6 miles east through heavy stands of yellow pine and lodgepole to the Sheep Ranch, large areas of dead and dying lodgepole pine were observed.

Examination made at the Sheep Ranch which is on the western edge of the "Whitman" show an enormous loss of timber, lodgepole pine and yellow pine, and most of this is on the private holdings. Five years ago when at this Ranch, I noted a few trees that were turning yellow, today you can see hundreds of acres of lodgepole pine in a dead and dying state due to the work of Dendroctonus monticolae Hopk.

From the Sheep Ranch, on a southeasterly course we ascended a heavily timbered ridge, between the Grande Ronde River, and Chicken Creek, at this point we noted large clumps of yellow pine which had been attacked and killed in 1912-13, this was at a point 4 miles southeast of the Sheep Ranch and close to the northwestern edge of the "Whitman". This timber was on private holdings, just before crossing the Forest Boundary, we counted in one clump 37 yellow pine trees, average diameter 24", these trees had been attacked in 1912 by D. monticolae Hopk.

and at this date August 17, 1913, the broods had all emerged and we counted an equal number of yellow pine just a few hundred feet further up the mountain that had been freshly attacked, eggs were being deposited, we could also see from this point other clumps of red tops which had died this year from the attack of 1912. Entering the Whitman Forest at this point we continued up the mountain side in a southeasterly direction for four miles, halting here and there to make examinations. We noted a large and quite new area of infestation in the lodgepole pine, very little old work could be seen, it was practically all fresh work, hundreds of pine were being attacked and eggs were being deposited, in a great many cases the beetles were just entering the outer bark, the foliage was green.

Reaching the summit of the main divide we could see the east slopes towards the Grande Ronde River and noted heavy infestation in the lodgepole pine both old and new. Continuing on our way a distance of 8 miles East from last distance given (16 miles from the Sheep Ranch) we had a fine view of the timbered slopes of the North Fork of the John Day River, and noted heavy old and new 1912-13 infested trees, lodgepole pine. The 1911-12 and the 1912-13 trees could be easily picked out, the color of the foliage of the former being a brick red and the latter a yellowish red. As we reached the summit near the North Powder Peaks we attained an altitude of 8,000 feet, the elevation at the Sheep Ranch is about 4,000 feet. From the Summit of this divide for a distance of 10 miles north, 10 miles east and 16 miles west we noted heavy infestation both old deadings and the new work also, in both the lodgepole pine and white bark pine, especially on both slopes of Antone Creek. On August 18th and 19th careful examinations were made in and around the head waters of the Grande Ronde River, Antone Creek and Anthony Creek, the lakes at the head of these streams are surrounded by thick stands of lodgepole pine and on the steep side hills surrounding the lakes there are large areas of scattering white bark pine. Both in the lodgepole pine and white bark pine, large clumps 20 to 35 trees were found infested and the young adults were emerging and attacking the sturdy healthy trees of both species. In patches close to some of the old infested areas, clumps of trees which had been passed over in the infestations of 1908-09 and 1910-11 and 1912 were found to be attacked and this conditions prevailed on the flats close to the lakes and down the canyons. When within four miles of the outer edges of the treated areas of the Anthony Creek, Camp area, the infestation ceased and no new infestation could be found either in yellow pine or lodgepole.

No new infestation was found on the treated areas on Anthony Creek, camp area. I assisted in making the examination of the treated areas in 1912 and am thoroughly familiar with the ground both on and off the treated areas, there is no new

infestation on this camp area and none for a distance of four miles on the borders of it. I know nothing about the conditions on the other camp areas this season as I did not go further than Anthony Creek camp. Mr. Edmonston continued the investigation south along the range and I returned to the North Powder Peaks to continue investigations there. On August 26 we started on our return trip by way of the Grande Ronde River trail, which leads in a northerly direction from the North Powder Peaks. All the way down this trail through the lodgepole pine we noted patches of new infestation, especially north of the Indiana Mine. When we crossed the north line of the Whitman Forest and got down on to the flat open park lands along the Grande Ronde River, we noted large areas of lodgepole on the private holdings that had been killed within the past four years and patches of 1913-14 infested trees. On one ridge along the River which was well covered with a good stand of yellow pine 50% of the trees had been attacked and killed during the past three years and about 10% of this stand was the work of 1912 broods and new infestation was found all along this ridge, trees in groups of from three to eight were found infested. At this point we were 9 miles west of the outer edge of the most northern Camp on the treated areas.

Continuing on down the River to the mouth of Limber Jim Creek, we noted large clumps of yellow pine dead and dying and lodgepole nearly all dead, insect killed and the same condition was met with as we continued our trip along the edge of the range to the Sheep Ranch. The distance traveled was 138 miles not counting side trips, we walked every foot of the way. My experience in looking through timber on a trip of this kind, is that you get far better results when you walk than when you ride a horse.

A note on old infestation by Dendroctonus monticolae Hopk., in Lodgepole pine within the Whitman Forest and lands bordering the Forest on the North.

Between the Sheep Ranch and Fly Valley there is an old wagon road which was constructed during the mining excitement when placer gold was found at Granite and Sumpter, Oregon. Granite is a little east of the center of the Whitman National Forest. This road was built from Walla Walla, Washington, to Granite, Oregon, in the year 1867, this date is a matter of record. This road after passing through the grass lands of the Sheep Ranch entered the dense thickets of Lodgepole pine as it wound around the mountain sides until the top of the divide was reached, then on to Granite at the head of a prong of the John Day River. Where the road was swamped through the lodgepole pine, one can still find the old trees that were cut and thrown to one side and piled along the road, some had been dead when removed from the right-of-way, these trees are nothing but a shell now, they are in bunches of 20 or 30 or

more, and all portions of the main trunks that have been sheltered from the weather show the primary egg galleries of Dendroctonus monticolae Hopk. Some of this timber must have been killed 50 years ago, seedlings and small trees at that time, which came up in the openings are now 6" and 8" in diameter, these trees are nearly all infested along this road and it is almost all 1911-12 and 1913-14 work. For a distance of two miles along this road you are in sight of newly infested trees all the way, both outside the National Forest, and inside where the road crosses the boundary line. I desire to state from what I observed on this trip that outside the treated areas there is no reduction in the infestation it is still very severe.

(Signed) GEO. HOFER.
Agent.

Report of the Present Condition of Insect Infestation on the

WHITMAN NATIONAL FOREST

Oregon.

By W. D. Edmonston, Entomological Assistant.

November 1913.

The object of this report is to state briefly the present status of the infestation on the Northeastern Oregon Project areas within the Whitman National Forest and private lands adjacent on which insect control work was carried on during April, May, and June 1911.

In 1912 the examination of the areas showed an average reduction of the infestation on the entire area, 76,430 acres, of close to 85%.

Examinations made this season 1913 show a still greater reduction in the infestation, in fact the infestation is so light that it is actually less on the treated areas than it is throughout any other area on this forest.

The examination of the treated areas was done in August, from the 19th to the 23rd, five days being spent on the treated area and nine days on infested areas on the forest where no control work had been done. The time chosen for the examination enabled us to judge not only of the infestation of 1912-13 but that of 1913-14. Very few trees seem to have been infested on the treated areas from the broods emerging in 1912 and I found none that had been attacked this year 1913, and the camp areas I did go over showed no fresh attacks.

On Anthony Creek camp area, the most northern camp, 4 trees 1912 were noted, no 1913. Big Gulch, Bulger Flat, North Powder River, Muddy Creek, Pine Creek and Marble Creek camp areas only 12 trees of the 1912 infestation were noted and no 1913 work was found. At Cold Springs Camp area, private holdings, 18 1912-trees were noted and no 1913 infestation was found.

1,889 yellow pine and 70 lodgepole pine were treated in 1910-11 on this area. I could only see a part of the Sheep Rock area but I did not note any fading or sorrel topped trees.

Poker Creek camp area, I could only see from a distance, but had a perfectly clear view and could only note two clumps of 1912 work, 3 trees in one and 4 in another.

There is no new infestation for from one to four miles from the treated areas and in some camps it is even further than this.

There is no reduction whatever on the zones of infestation 4 miles beyond the treated areas. This new infestation or 1913 infestation extends without a break for at least 40 miles west of the treated areas. There was no reoccupation of the treated areas by broods from the lodgepole infested trees at higher elevations. The cutting and treating of the trees is the only reason for the check of the infestation and the fostering of all natural agencies especially in the yellow pine where little if any debris was burned, which allowed the beneficial insects to escape. The reduction in the broods of Dendroctonus and the decided increase in all the beneficial insects has had its effect.

Until this year although I have looked specially for them, I was unable to find Clerids following up the broods of Dendroctonus when attacking in the lodgepole pine, but this year they were in great numbers and even at an elevation of 7,500 ft. I found them following right up with the attacking broods of Dendroctonus monticolae Hopk. The green beetle Variscens was also present in great numbers.

Mr. Hofer's report will cover the trip from Albee to the treated areas so that I shall not touch on that at present. The map will be submitted later when my other more detailed observations will be submitted.

WHITMAN NATIONAL FOREST Oregon.

(Extract from summary - Whitman and adjacent)

March 21, 1914. Hopkins to Edmonston.

From your knowledge of the area, what percentage of the infestation in the yellow pine do you estimate was disposed of in the control operations, taking in consideration trees of all sizes that were left untreated within the area and those within 3 or 4 miles of the area. Of course, if we consider the infestation in the adjacent lodgepole, the percentage would be greatly reduced.

March 31, 1914. Edmonston to H.

We did not treat in the yellow pine more than 55% and if we consider the lodgepole infestation that was on the areas when in mixture with the yellow pine then we only treated 40%. There was a great deal of infested lodgepole where we cut and treated yellow pine from Anthony Creek south to Pine Creek, this strip was 18 miles long and about 3 miles wide along the eastern edge of the Whitman forest.

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Map of Treated Areas.

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Report 1912.
By W. D. Edmonston,
Northeastern Oregon Project No. 38.
Branch of Forest Insects,
Bureau of Entomology.

On Work Begun in May and Completed Sept. 24. Edmonston and Agents Sergent and Hofer from Station 6, and Agents Angel and Sullivan from Station 5.

December 30, 1912.

Preceding the examination of the Project areas the following instructions were received from Dr. A. D. Hopkins, In Charge of Forest Insect Investigations.

General Instructions for Inspection of Area Covered by Northeastern Oregon Project 38, Branch of Forest Insects, Bureau of Entomology.

The purposes of the inspection are as follows:-

In the treated area -

1. To determine the number and average size of the 1911-12 infested trees within the area treated in 1910-11. No infested trees below about 4 inches in diameter B.H. should be counted. No tree should be designated as infested unless examined and living broods of Dendroctonus monticolae or Dendroctonus brevicomis are observed in the bark.

2. To determine the number of trees attacked but in which the broods failed to develop.

3. To determine the number of red-topped trees not treated from which broods emerged in 1911.

In the adjacent untreated area -

4. To determine, in a general way, the relative extent of 1911-12 infestation as compared with the red-topped trees of the 1910-11 infestation.

In the check area -

5. To determine the relative amount of 1911-12 infestation to the 1910-11 infestation in the southern Wallowa area examined last year by Mr. Edmonston.

Special Instructions.

In all of this inspection work the primary object should be to get

the facts and evidence regardless of any preconceived ideas, theories, or conclusions.

The project, on account of the widespread depredations and adjacent infested lodgepole areas, must be considered as a big experiment. If there is increase or decrease of infestation in any section or township of the treated area we want to know it, and we want to have all of the available facts and evidence for thorough study before any opinions are formed or given out as to general or specific results or any reasons for the conditions found. This is important in the interest of the best service.

(signed) A: D: Hopkins,
June 18, 1912.

Introduction.

The writer with the assistance of the agents detailed to assist in the work has tried to confine the examination strictly to the main object as outlined in the written instructions.

The work of inspection was greatly facilitated from the fact that the agents including the writer had all worked on the original project from its commencement April 5, until its close on June 30, 1911.

It was expected and understood that the Forest Service would cooperate and assist in making the examination. It will be sufficient to state that they did not do so; nor did they render any assistance in any way whatsoever.

The writer was ably assisted in the examination and collection of data on which this report is based by Agents J.J.Sullivan and A.G.Angell who were detailed from Forest Insect Field Station 5, and Agents P.D.Sergent and Geo Hofer of Station 6.

The work was carefully and accurately done, no hap-hazard methods were at any time permitted nor were any attempted. The countwas perhaps more carefully made than if the intention had been to cut and treat the trees located. Where two years' infestation had to be tallied it prevented any trees being overlooked; the particular tree had to be examined and put in the class where it belonged either a red-topped tree of 1910-11 or infestation of 1911-12, it had to be counted on one side or the other. With experienced men in this special line of work there was little danger of any serious error due to wrong classification.

In the opinion of the writer the only possible error that could be made would be due to the examiner finding in a tree abandoned by monticolae a partial brevicomis brood and instead of counting it as a red-top and the infestation of 1910-11 he might under some unusual condition of the tree due to other factors count it as a 1911-12. This did not happen very often so that few errors could have been made.

The writer has tried to keep from forming any conclusions except where it was impossible to do otherwise. In some cases it was found impossible to

make the data secured plain enough to express what was intended without supplying the reason for not being able to do so. In such cases the writer has of course had to supply what was lacking from his own conclusions but as they are in no way connected with the actual facts and figures submitted they should be permissible.

Anthony Cr., Camp #2.

Tp.	S.Rg.	E.Sec.	Area Covered Acres.	Infestation. 1910-----1911 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Y.P.	Infestation. 1911---------1912 Ave. D.B.H.	L.P.	Ave. D.B.H.
6	37	1	240	33	0	33	0	50		0	
		12	160	17		9		14			
6	38	6	320	55		25		35			
		7	640	177		36		75			
		18	640	26		16		47			
		19	320	15		11		34			
			2320	323	0	130	0	255	21"	0	

Big Gulch, Camp #5.

6	37	36	320	24	0	16	0	16			
6	38	29	640	6		4		4			
		30	500	12		10		9			
		31	640	7		13		15			
		32	640	19		15		12			
7	38	5	320	16		28		32			
		6	440	9		28		22			
			3500	93	0	114		110	20"		

Bulger Flat, Camp #2.

7	37	1	400	38	0	0	0	0			
		12	240	8		0		0			
		13	320	55		11		69			
7	38	7	640	145		23		19			
		8	640	48)		) 270		148			
		9	640	65)-		)					
		18	480	69		0		0			
			3360	428	0	304	0	236	20"		

North Powder, Riv. Camp #5.

7	37	13	320	196	0	0		200			
		24	40	18		9		8			
		25	320	661		18		105			
7	38	18	160	11		0		0			
		19	320	139		2		18			
		30	480	232		3		61			
		31	400	353		2		30			
			2040	1610		34		422	16"		

1912--Examination. Dendroctonus Species Infesting. Monticolae	Brevicomis.	1911-----12. Number of Infested Saplings Noted. Yellow pine.	Total Decrease Yellow Pine %	Total Decrease Lodge.P. %
		12		
		4		
		47		
		37		
		23		
		59		
203	52	182	29 2/7%	00
		21 (1912--13)		
177	33	21	(18 2/7% Increase).	00
		}--150		
166	70	150	44 4/7%	00
198	2	14		
8	0			
105	0	6		
16	2	10		
60	1	21		
30		6		
417	5	57	73 7/9%	00

Muddy Cr., Camp #5.

Tp.	S.Rg.	E.Sec.	Area Covered Acres.	Infestation 1910-----1911 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Infestation 1911-------1912 Y.P.	Ave. DBH	L.P.	Ave. DBH.
7	38	28	640	23	0	0	0	25		0	
		29	320	13		3		59			
		30	160	201		7		10			
		31	240	74		0		4			
		32	640	103	0	0	50	67		45	
		33	160	19				64			
8	38	5	480	66		2		35		67	
		6	640	133		12		73			
			3280	632	0	24	50	333	17"	112	8"

Pine Cr., Camp #2.

8	38	21	640	70	8	0	0	0			
		22	640	5							
		27	640	3							
		1920	1920	78	8	0	0	0		0	

Marble Cr., Camp #2.

9	38	1	640	113	256	0	0	0		0	
		12	640	147	1550	18	24	24		32	
		13	320	116	174	4	0	5		0	
9	39	6	320	63	0	0	0	0		0	
		7	640	390	95	7	0	15		0	
			2560	829	2075	29	24	44	17"	32	9"

Hibbard Gulch, Camp #2.

9	38	13	320	344	0	0	44	3		28	
		24	320	351	183	0	0	0		0	
9	39	17	480	113	0	12	0	16		0	
		18	640	180	0	11	11	11		12	
		19	160	9	0	0	0	0		0	
			1920	997	183	23	55	40	15"	40	9"

1912---Examination Dendroctonus Species Infesting. Monticolae---Brevicomis.		1911--12. Number of Infested Saplings Noted. Yellow pine.	Total Decrease Yellow Pine	Total Decrease Lodge.P.
327	0	0	44 4/5%	00
0	0	0	00	00
		39 9		
35	9	56 104	82 5/9%	98 2/7%
		41 31		
35	5	72	95 2/7%	78 1/5%

1912 --Examination. Dendroctonus Species Infesting. Monticolae---Brevicomis.		1911--12. Number of Infested Saplings Noted. Yellow Pine	Total Decrease Yellow Pine %	Total Decrease Lodge.P. %
		24		
		99		
		9		
		22		
25	4	64	98½%	95 5/6%
		53		
		00		
		55		
		155		
		00		
		10		
		129		
		00		
		00		
216	25	402	66 7/8%	00
		22		
		20	(increase)	
310	60	42	23½%	00

Elk Cr., Camp #1.

Tp.	S.	Rg.	E.	Sec.	Area Covered Acres	Infestation. 1910-----1912 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Infestation. 1911-------1912 Y.P.	Ave. DBH	L.P.	Ave. DBH
9	39		19		480	23	1910	0	60	0		80	
			26		400	192				0		0	
			27		640	2				0			
			28		640	128	5	11	0	4		0	
			29		640	242	30	4	280	5		0	
			30		640	94	542	2	40	3		0	
			32		640	66	111	0	0	0		0	
			33		640	267	0	0	0	0		0	
			34		640	837	0	0	0	0		0	
			35		400	811	0	0	0	0		0	
10	39		4		160	126	0	3	0	7			
			5		40	5	86	8	0	10			
					5960	2793	1784	28	380	29	17"	80	9"

Poker Cr., Camp #1.

9	39		31		500	33	193		10	18		0	
10	39		5		600	70	0			0			
			6		400	101	12			5		0	
			7		400	33		8		28			
			8		640	369		2		41			
			9		320	192		8		12			
			16		160	14				1			
			17		640	192		1		109			
			18		450	19		8		33			
			20		320	8				12			
					4430	1031	205	27	10	241	21"		

Union Cr., Camp #4.

10	38		11		640	69	0	27	0	106			
			12		320	28		12		32			
			13		320	26		13		36			
			14		640	16		22		91			
			24		220	23		7		4			
			1		640	58		18		26			
			2		640	79		21		75			
					3420	299	0	112	0	370	20"	0	

Miners Cr., Camp #1.

Tp.	S.	Rg.	E.	Sec.	Area Covered Acres	Infestation. 1910----1912 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Infestation. 1911------1912 Ave. Y.P.	DBH	Ave. L.P.	DBH
9	38		26		460	6	565	2	100	1		175	
			27		480	1	10			7		0	
			28		640	32		3		16			
			32		639	23		31		49			
			33		687	60		22		64			
			34		645	73	46	1		70		40	
			35		609	67	188		200	36		250	
10	38		3		640	67		14		90			
			4		80	8				0			
					4830	336	809	73	300	333	18"	465	8"

Deer Cr., Camp #1.

9	37		24		640	21	0	4	0	12		0	
			25		640	20			180	16		200	
9	38		19		570	18		8		22		25	
			20		626	5		1		23			
			21		636	4				0			
			29		628	23		8		16			
			30		630	20				55		60	
					4370	111	0	16	180	144	16"	105	8"

Sheep Cr., C. #3. White Face, C. #3.
Snow Ball, C. #3. Sumpter, Camp #8.

9	36		25		320	0	9	1	2	2		3	
			36		640	2	8			0		0	
9	37		2		640	1	778		21			36	
			3		280	4	664		15			25	
			4		420	66	800					0	
			9		410	38	568	3	9	10		25	
			10		640	20	1591		8	6		11	
			11		640		231					0	
			14		640	5	63	0	0	0		0	
			15		640	17	216		34	2		39	
			16		640	22	4			0		0	
			21		640	11	21	8	32	7		30	
			22		640	40	288	4	21	7		23	
			23		640	89	71	13	23	7		16	
			26		640	27	47	6	28	7		14	
			27		640	16	160	2	20	7		25	
			28		640	10		3	3	2		0	
			30		640	38		2	1	9		4	
			31		320	0	1	2	5	22		12	
			34		200	3	0	0	0	0		0	
					10910	409	5220	44	222	69	18"	289	9"

1912---Examination. Species Dendroctonus Infesting.		1911---12. Number of Infested Saplings Noted.	Total Decrease Yellow pine	Total Decrease Lodge.P.
Monticolae---Brevicomis		Yellow Pine.	1	1
			.01%	42 6/7%
		14		
388	45	14	.01%	42 6/7%
129	15	0	(27 11/12 %increase)	00
		8		
		4		
		13		
		9		
		2		
69	0	36	83 1/7%	42 1/3%

Slim Cr., Camp #6.

Tp.	S.	Rg.	E.	Sec.	Area Covered Acres.	Infestation 1910----1911 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Infestation. 1911-----1912 Ave. Y.P.	DBH	Ave. L.P.	DBH
9		37	8		320	21	62	4	13	7		22	
			17		640	30	13	6	21	17		0	
			18		640	23	30	5	3	28		12	
			19		50	1	4	7	51	13		0	
					1650	125	109	22	88	65	20"	34	9"
Cracker Cr., C. #5.													
8		37	32		200	0	82	0	0	0		0	
			33		480		288		7			17	
			34		140		99		0			0	
9		37	4		220		160		15			40	
			5		510	2	430	0	12	0		38	
					1550	2	1005	0	34	0		95	9"
Fruit Cr., C. #1.													
8		37	30		0		14		0			0	
			31		320	1	948			0		0	
			32		240	3	425			0		0	
					560	4	1387	0	0	0		0	
Fruit Cr., C. #6.													
8		36	25		160	0	102		46	0		96	
8		37	19		320		159		0	0		0	
			29		100		116		0	0		0	
			30		600		791		72			76	
			31		160		219		0			0	
					1200	0	1387	0	201	0		172	9"
Silver Cr., C. #4.													
8		36	26		60	0	107	0	90	0		25	
			35		90		457		5			40	
			36		640		1047		5			56	
8		37	31		60		399		32			100	
					850	0	2037	0	72	0		221	9"

1912 -- Examination. Dendroctonus Species Infesting. Monticolae	Brevicomis.	1911--12. Number of Infested Saplings Noted. Yellow Pine.	Total Decrease Yellow pine %	Total Decrease Lodge.P. %
		11		
		29		
		5		
		7		
57	18	52	48%	68 9/11%
		9		
		4		
		13	00	90 2/7%
		0	00	00
		0	00	87 4/7%
		0	00	89 1/10%

Sheep Rock, Camp, #8.

Tp.	S.Rg.	E. Sec.	Area Covered Acres.	Infestation 1910-----1911 Treated Y.P.	Treated Lodge.P.	Red Tops Y.P.	Red Tops L.P.	Infestation. 1911-----1912 Y.P.	Ave. DBH	L.P.	Ave. DBH.
11	38	5	640	33	0	11	0	11		0	
		7	480	12		2		19			
		8	640	26		7		18			
		9	320	20		3		8			
		10	80	15		0		0			
		16	160	14		4		5			
		17	640	35		18		7			
		18	640	7		2		0			
		19	640	19		0		5			
		20	320	11		3		5			
		21	320	8		1		3			
		25	480	9		0		4			
		26	640	15		1		4			
		27	100	5		0		0			
			6100	229	0	52		89	19"	0	0

Cold Springs, Camp #7.

11	38	10	320	16	0	1	0	4		0	0
		11	320	176		2		16			
		12	200	106		0		4			
		13	640	329		3		15			
		14	640	171		3		23			
		15	640	75		1		10			
		22	120	16		0		4			
		23	640	17		0		3			
		24	640	71		0		10			
11	39	5	320	124		3		16			
		6	320	92		0		8			
		7	640	328	70	7		40			
		8	640	138		4		35			
		9	320	10		1		6			
		15	160	12		0		9			
		16	640	42		3		24			
		17	640	33		3		18			
		18	640	152		3		23			
		19	320	27		1		7			
		20	320	35		1		6			
		21	320	17		2		14			
		22	120	2		2		4		0	0
			9560	1889	70	40	0	299	14 1/3	0	0

12---- Examination. Dendroctonus Species Infesting.		1911--12. Number of Infested Saplings Noted.	Total Decrease Yellow Pine.	Total Decrease Lodge.P.
Monticolae----	Brevicomis.	Yellow Pine.	%	%
8	3	3		
6	13	3		
10	8			
6	2			
0	0	3		
3	8			
4	3	5		
0	0	5		
2	3	2		
3	2			
3	0			
1	3			
2	2			
0	0			
48	41	18	61 1/9%	00
2	2			
12	4	6		
1	3			
6	9			
12	11			
6	4			
3	1			
8	1			
10	0			
11	5			
8	0			
34	6	31		
23	12	11		
3	3	0		
8	1	4		
18	6	6		
9	9			
10	13			
7	0	4		
3	3			
11	3	8		
8	8			
201	98	73	86 1/11%	00

Totals for Camp Areas.

Camps.	Area Acres.	Treated Y.P.	Treated D.P.	Red Tops Y.P.	Red Tops L.P.	Infested Yellow Pine	Infested Lodgepole Pine
Anthony Cr., No. 2.	2320	323	0	130	0	255	0
Big Gulch, No. 5.	3500	93	0	114	0	110	0
Bulger Flat, No. 2.	3360	428	0	304	0	236	0
North Powder, No. 5.	2040	1610	0	34	0	422	0
Muddy Cr., No. 5.	3280	632	0	24	50	337	112
Pine Cr., No. 2.	1920	78	8	0	0	0	0
Marble Cr., No.2.	2560	829	2075	29	24	44	32
Hibbard Cr. No. 2.	1920	997	183	23	55	40	40
Elk Cr., No. 1.	5960	2793	1784	28	380	29	80
Poker Cr., No. 1.	4430	1031	205	27	10	241	0
Union Cr., No. 4.	3420	299	0	112	0	370	0
Miners Cr., No. 1.	4830	337	809	73	300	333	465
Deer Cr., No. 1.	4370	111	0	16	180	144	105
Sheep Cr. No. 3.							
Snowball, No. 3.							
White Face, No. 3.							
Sumpter, No. 8.							
Total for 4 Camps.	10910	409	5220	44	222	69	259
Slim Cr., No. 6.	1650	125	109	22	88	65	34
Cracker Cr., No. 5.	1550	2	1005	0	34	0	95
Fruit Cr., No. 1.	560	4	1387	0	0	0	0
Fruit Cr., No. 6.	1340	0	1387	0	201	0	172
Silver Cr., No. 4.	850	0	2037	0	72	0	221
Sheep Rock, No. 8.	6100	229	0	52	0	89	0
Cold Springs No. 7.	9560	1889	70	40	0	299	0
Total ----------	76430	12219	16279	1072	1616	3083	1615
Baker Forest Protective Association.							
Tp.11 S.R.40E.							
11 41							
12 40							
12 41							
Total ----------	11520	2264	3728	0	0	0	0

Totals--Forest Service.	Area Number Acres	Treated Y.P.	Treated L.P.	Red Tops Y.P.	Red Tops L.P.	Infested Yellow Pine.	Infested Lodgepole Pine.
	76430	12219	16279	1072	1616	3083	1615
Totals--Baker Forest P.A.	11520	2264	3728	0	0	0	0
Grand Total----	87950	14483	20007	1072	1616	3083	1615

Grand Total All species ---

Treated
Yellow pine & (14483)
Lodgepole pine (20007)
34490

Found Infested
Yellow pine & (3083)
Lodgepole pine (1616)
4699

Totals for District Areas, or Units.
See Map ----Attached.

District	Area Acres.	Treated Y.P.	Treated L.P.	Red Y.P.	Red L.P.	Infested Y.P.	Infested L.P.	Decrease Y.P. %	Decrease L.P. %
Camp Areas From Anthony Cr., To Elk Cr.	21860	7783	4050	686	509	1473	264	893/7	933/3
			(Unit 1)						
Deer Cr., To Poker Cr.	17050	1778	1014	228	490	1088	570	382/3	436/10
			(Unit 2)						
Silver Cr., To Sumpter	16860	540	11145	66	617	134	781	803/7	931/3
			(Unit 3)						
Sheep Rock & Cold Springs	15660	2118	70	92	0	388	0	811/2	00
			(Unit 4)						
Baker Forest Protective Association	11520	2264	3728	0	0	0	0	00	00
			(Unit 5)						
Grand Totals--	87950	14483	20007	1072	1616	3083	1615	784/7	914/7

This table has been arranged so that the result of the work can be judged in relation to the natural geagraphical position or grouping of treated areas. In other words, a number of ca,p areas have been grouped to form a unit where a natural division made this possible.

Unit 1, has a decided eastern exposure and is practically cut off from Unit 2, by a high divide. Unit 2, has a typical southern exposure and is separated to a great extent from Unit 3 by being at a generally lower elevation and the steep canyon north slope type at its junction with Unit 3. Unit 3, is nearly all at a high elevation and lodgepole pine predominates. Unit 4, is separated from Unit 2 by a wide grass valley and non treated areas. Unit 5, is also surrounded by non treated areas.

The writer believes that this division into Units will give a much more comprehensive idea of the result of the work than if based on individual camp areas, or even the entire project area.

Resume.
Report on Project 38, 1912.

Total acreage covered by Project ----------87950.

Total number of yellow pine trees treated, infestation of 1910-11, ----------14483.
Total number of yellow pine found infested -- 1911-12, 3083
Reduction ---- 11400.

A percentage reduction of 78 4/7%

Total number of lodgepole pine trees treated, infestation of 1910-11, ----------20007
Total number of lodgepole pine found infested 1911-12 ---------- 1615
Reduction ---- 18392

A percentage reduction of 91 4/7%

The total number of all species treated was 34,490 and the number found infested 4, 698, a reduction in the number of trees of -- 29792

A percentage reduction of 86 3/7%

Diameters.

(The average diameter of yellow pine trees treated in 1911 was -17.85 in.
(" " " " the 1911-12 infested trees----------18.13 in.

(The average diameter of lodgepole pine treated in 1911 was ----10.44 in.
(" " " " the 1911-12 infested trees ---------- 9. in.

The writer believes that as the diameters were taken by the crew foreman in a number of different ways, in and outside the bark, and stump diameter, in some camps, the average arrived at can not be depended upon. (For diameter details, see sheet under that heading.)

Heights.

The average heights of the 1911-12 infested trees of both types were much the same as those for 1910-11. The Barnes Angell report gives the average heights as follows----- Yellow pine 74.75 feet, lodgepole pine 71.20. The writer believes that accuracy in diameters is much more important than height measurements, for this reason; that the height has no particular significance in relation to the death of the tree when killed by insects; as it is well known that if a few feet only of the main trunk is entirely infested the tree will succumb; and also in the examination of standing timber the height can only be estimated. In future work all diameters should be taken outside the bark, as this would make the comparison between one years' infestation and another very much more accurate and much easier.

Acreage.

The difference in the total acreage given in this report (Association cutting area area spring of 1911 not included except in grand total.) and that of former reports on the project is due to a few corrections in the way of reductions and additions and are confined strictly to the area and in no way affect the tree count.

The Barnes and Angell report gives the total area cruised and treated as 94,890 acres, on the other hand, their report by sections of the treated areas only amounts to a total of 83, 690 acres. The following reductions and additions have been made which makes the total acreage in this report 76430, and this the writer believes to be correct.

	Reduction.		Add.	
Boundry Creek Camp area. Was supposed to cover about 5 sections in Tps. 9 & 10 S.R. 35½ E. As only 13 yellow pine & 4 lodgepole were cut on the areas and the area was far removed from the main Project area, it is eliminated. No infestation of any importance was observed on this area.	2,760	@		
Sec. 36, T. 7 S.R. 37 E. No trees were treated on this section, those credited to this section were cut on section 31, Tp. 7 S.R. 38 E.	80	@		
Sec. 18, Tp. 7 S.R. 38 E. 640 Acres, reduced to 480.	160	@		
Sec. 31, Tp. 8 S. R. 37 E. 640 " " " 540	100	@		
Sec. 25, Tp. 9 S.R. 36 E. Omitted from former reports.			320	@
Sec. 5, Tp. 9 S.R. 36 E. 640 Acres, reduced to 510	130	@		
Sec. 18 Tp. 9 S.R. 38 E. No cutting done.	160	@		
Sec. 12 & 13, T. 10S. R. 38 E. 1280 Acres, reduced to 640.	640	@		
Sec. 4, Tp. 10 S.R. 39 E. 560 Acres, reduced to 400.	160	@		
Sec. 9, Tp. 10 S.R. 39 E. 480 " " 320	160	@		
Sec. 20, Tp. 11 S.R. 38 E. Omitted from former reports.			320	@
Sec. 24, Tp. 11 S.R. 38 E. " " " "			640	@
	4350	@	1280	

No consideration is given to the total of 94,890 acres; being impossible to tell how it was arrived at. The difference then between the reports is 2,910 acres and this may be due to duplication of section acreage where two camps cut on the same section.

Diameters.

Too much credence should not be placed on the diameter figures. The diameters of the 1911-12 infested trees had of course to be taken outside the bark. I am inclined to think that the average diameters for the yellow pine trees, taking into consideration the methods used in arriving at them, can be safely assumed to be so close that an average diameter for both years would be 18 inches out side the bark.

In the Baker Association fall work of 1910, Mr. H. E? Burke kept an accurate table of all yellow pine diameters, D.B.H. outside the bark, over 700 infested trees were calipered. The report gives the average diameter as 21 inches. This area was known as Cold Springs. On the same area in the spring work of 1911 the average diameter is given as 17.85 in., or rather we have to assume that this is the diameter for this camp area although based on all the yellow pine cut on the Project between April 5, and June 30, 1911. The Barnes Angell report does not give the average diameters for camp areas. As Mr. Burke's report is based on actual measurements and for a camp area we can use them in this one camp for a comparison between the infestation of 1910 and that of 1911. In the infestation of Cold Springs camp area of 1910-11 the average diameter of the trees is 21 in. in 1911--12 it is 19 1/3 inches. Nine camp areas show an average diameter of about 1 in. greater and 7 about 2 inches less. Making allowance for the difference in methods of arriving at the diameters, it is fair to assume that if there is a slight difference in the average diameters of the infested trees of the 1910-11 and the 1911-12, it is a very slight reduction in favor of the 1911-12 trees; this however may be more apparent than real; on the other hand we can be perfectly certain there is no increase. In the Lodgepole type there is a reduction of about one inch in the average diameter. The 1910-11 is 10.44 in. and in the 1911-12 it is 9 in.

Totals for Entire Area.
Dendroctonus Species Infesting.
Number of Saplings Infested.

The yellow pine saplings listed of which there is a total of 1, 360 are not deemed of sufficient importance to include in the figures of trees found infested. The average diameter of the small trees or saplings was 4½ in., the broods infesting were found to be few in number and in an unhealthy state. All infested trees over 6 in. D.B.H. were counted and are included; those below are not, but are listed in the tables under "Saplings noted". As the treated trees listed as peeled standing, were from 4 to 12 in., D.B.H. the average diameter being given 7.05 in., they have been counted in the tables of trees treated. By far the largest number of trees peeled standing was on the Elk Creek Area; 1, 967 being the total thus treated. On this Camp area only 28 yellow pine were found infested. The combining of trees treated standing and those cut in this camp could have no bearing on the percentage of decrease arrived at, and this will also apply to other camp areas.

Dendroctonus Species Infesting.

The figures show that 15 1/5 % of the 1911-12 infested yellow pine was infested solely by D. brevicomis. In the 1910-11 infestation (based on Cold Springs and Wind Creek Camps), while a good deal of infestation by brevicomis was noted it was in nearly all cases confined to a few feet on the base of the main trunk; the average about 8 ft. When the examinations are limited to a few feet of the trunk it is obvious that mistakes might follow; special care was taken in this examination to avoid any hasty decision.

Where the general appearance of an infested tree indicated brevicomis work, special pains were taken to arrive at a correct determination. After a thorough inspection of the trunk as high as could be reached with the axe, field glasses were used, pitch tubes and exit holes were noted and woodpecker work seldom absent in such trees. When the upper portion of the main trunk shows a flaked off appearance of the bark it is prima facie evidence that the tree is thoroughly infested by brevicomis. On a monticolae tree the woodpeckers dig small round holes, on a brevicomis tree, they strike the bark a glancing blow, first on one side, then on the other, in this way the outer layer is partly removed and the young larvae or adults are exposed, in the spring months it is not a difficult matter to pick the brevicomis trees from the monticolae infested trees if the woodpeckers have been at all busy. The point the writer wishes to bring out is; that if D. brevicomis was as strong in the infestation of 1910-11 as it has proved to be in that of 1911-12 then the crew foremen and treatment crews neglected to properly treat many of the trees in some of the camp areas, especially those at a low elevation, on thd other hand, it is clear that where brevicomis is unquestionably strong, a very large number of Red top trees are recorded such trees were those missed by the cruisers or marked trees passed by the treatment crews. This was specially noticable in Anthony, Big Gulch and Bulger Flat camp areas, operating in the month of April when at least 70% of the infested trees were still green and the cruisers all new at the work.

Results & Percentages

In the treated areas where the work was done during the month of June a decided improvement is seen in the results in comparison with work through April and May. For data on April and May work see tree table.

The following is a list of the Camps operating during June; and the percentage of decrease in the number of infested trees for each Camp area.

Camp Number. Name.	Decrease Yellow Pine	Decrease Lodgepole Pine
1----(Elk Creek,	98½%	95 5/6%
(Fruit Creek; no infestation 1911-12.		
2--- (Marble Creek	82 5/9%	98½%
(Hibbard Gulch	95½%	78 1/5%
3----(All combined; May & June	83 1/7%	95 1/13%
4----(Silver Creek		89 1/10%
5----(North Powder	73 7/9%	
(Cracker Creek		80½%
6--- (Fruit Creek		87 1/7%
7----(Cold Springs,	84 1/11%	
8----(Sheep Rock	61½%	

It is quite evident that as the work of locating and treatment proceeded, the cruisers and treatment crews and crew foreman became more familiar with their respective duties; the results obtained show this very plainly. Camp 8, Sheep Rock was so late in going onto the area that the broods from the trees recorded under Red Tops had all emerged before they could be reached and treated; in fact from many of the trees that were cut much of the brood had emerged.

Fewer Red top trees are recorded on the areas treated in June; this can be accounted for in two ways; The cruisers became more proficient and a higher per cent of the yellow pine had fading foliage, making them easier to locate.

Results & Percentages.
Continued.

The number of Red Top lodgepole pine recorded from areas which were treated through June, is not due to the fact that such trees were missed by cruisers or treatment crews; but for the reason that cutting stopped before the trees could receive treatment.

It will be as well to mention that the record of work of Camp No. 3, has all been included under one unit and includes Sumpter Camp No. 8. While Camp No. 3, found it necessary to make three moves, this was more on account of reducing the walking distance to and from camp, and not for the reason of there being separate and distinct units. The three units of Camp 3, overlapped one with the other, and Camp 8, Sumpter, also cut over a part of the area.

In making the examination of the 1911-12 infestation it was found impossible to properly divide the areas, therefore, all work on these Units has been classed under one head in the Tree Table.

Work which was done in the fall of 1910 on Wind Creek has been credited to Camp 3, as it could not be properly separated, a unit of Camp 3, covered part of the area. In this connection it is as well to mention that the figures given in the Cold Springs, Camp area, No. 7, also include the trees treated in the fall of 1910.

The work of reexamination and assembling the figures has by no means been a simple matter, but as it has little to do with the actual results of the Project as a whole, the writer will not touch on that phase of the subject.

The percentage of decrease given both in Camp Units and the totals is based entirely on the tree count. No consideration has been given to Camp areas where no new infestation was found nor where an increase has been recorded except in the final percentage totals, and the figures are based entirely on the total number of trees treated in comparison to the number found infested.

No new infestation was recorded from the Baker Forest Protective Association areas, none from Pine Creek area, and none from Fruit Creek area, Camp 1. Where some Camp areas show an increase it will be noted that a large number of Red Top trees are recorded.

	Volume in Feet Board Measure.		Reduction Ft.B.M.
	1910-11 Treated Trees.	Infestation 1911-12.	2,143390
Yellow pine.	2,914130 Ft. B.M.	770,750 Ft.B.M.	
Lodgepole "	1,295960 " "	96,900 " "	1,199060
Total	4,210090 " "	867,650 " "	3,342440 Ft.

The reduction in volume is therefore	3,342440 Ft. B.M.
Addition B.F.P.Assn.,Volume--------	610310 " "
Grand Total reduction in Ft.B.M.	3,953750

The above figures are as correct as an estimate not based on actual log scale of the timber can be made.

Lodgepole pine.
Estimate of rate of infestation.

The following estimate is based on colour of foliage; it covers an area of approximately 4 sections (2,560 @). The area lies N.W. of the extreme northern limits of the treated area but at a much higher elevation. The location is about central in the S.E. 1/4 of Tp. 5 S.R. 37 E. W. Mer. From a point of vantage overlooking the area it was possible to arrive at the extent of each area according to the color of the foliage of the trees.

Infestation Year.	Color of Foliage.	% of Area
1905-6	Black-top, broken top, some down trees.) (Possibly 20% died prior to 1905)--------	25%
1906-7	Black-top, no foliage.	
1907-8	Reddish-black tops, foliage some.	20%
1908-9	Reddish-brown tops, foliage.	25%
1909-10	Red-tops. Evidently a migration occurred in the season of 1909.	10%
1910-11	Yellowish-red tops, (Sorrel tops).	12%
1911-12	Green not infested.	8
		100%

It was a difficult matter to determine the area of green timber for the reason that the trees were scattered all through the tract.

Counts on average acres on one of the sections showed that the number of trees per section would be about 240,000, which is close to one million trees for the entire area. An acreage count taken on the same area at intervals of about 1/4% a mile gave the following results:

Area.	1911-12 Abandoned Red Tops	Green Not infested	Area	Green	Sorrel	Red Top	Black Top
1 Acre.	324	17	1 Acre	172	4	52	136
1 Acre.	714	31	1 Acre	424	37	200	00
1 Acre.	483	14	1 Acre	240	276	116	00
1 Acre.	441	31					
4 Acres	1962	93	3 Acres	836	317	368	136

The writer submits the above figures with the hope that they may prove of some value. The work was carefully done and the figures can be relied upon. It would appear to be an almost hopeless task to attempt a count on lodgepole pine and expect to secure data of any value. A small area can not be reliable and a large one to get results would take months to make the count.

Check Area Showing
Percentage of Increase in
Number of Infested Trees.

Tp.	S.R.E.	Sec.	No. Acres.	Infestation 1910-11 Red tops Yellow P.	Ave. D.B.H.	Species Infesting Mont.	Brev.	Infestation of 1911-12. Green Y.P.	Ave. D.B.H.	Species Infesting Mont.	Brev.
11	39	24	640	15	20"	8	7	74	18"	46	28
		25	640	14	20"	8	6	55	15"	45	10
11	40	19	640	25	21"	8	17	63	20"	36	27
		30	640	22	14"	19	3	57	16"	45	12
Totals		------	2560	76	18.5	43	33	249	17.5	172	77

The figures clearly show that, the increase between the number of trees in the infestation of 1910-11 and that of 1911-12 was at the rate of 240 6/7%. 19 trees per section died from the 1910-11 infestation and 62 trees from that of 1911-12. The species infesting increased in its tree killing power for monticolae 300% and brevicomis 133 1/3%.

This "Check Area" was selected being considered a fair average area. It is surrounded by non treated areas except on the east side where it joins two sections on which 15 yellow pine had been treated. There is no lodgepole pine on the area or areas adjacent. It is therefore a typical average yellow pine area within the infested zone.

It is quite evident from the data recorded from this area that the increase on non treated areas of the 1911-12 infestation within the zone of general infestation is much the same as that recorded from the same locality in 1910 by Mr. H. E. Burke. On special tracts on the Cold Springs area Mr. Burke found after a very careful cruise that the rate of increase in the infestation was 2 to 1 and 3 to 1. On another area the rate of increase was 2½ to 1 and 1 to 1.

That there has been a decided increase in the number of infested trees since 1907 can not be questioned; all examinations go to show that there has always been some increase each year from 1907 to 1912 within the area composing the zone of infestation. While the rate of increase may vary greatly from year to year and also in different parts of the infested area, there has been no decrease until the present time. It is significant that it is confined almost exclusively to the treated areas.

Where a higher percentage of lodgepole pine was treated and fewer infected trees were left, it was observed that there was a reduction of the infestation for some distance beyond the treated areas, this however, in the opinion of the writer is problematical. At varying distances from the treated areas the rate of increase in the number of infested lodgepole pine was found to be 1 to 1.

In the yellow pine type we have accurate data covering a period in this one project of at least six seasons of infestation. The lodgepole will be reported under a separate heading.

Lodgepole pine.
In the Adjacent Untreated Areas.

The 1911-12 infestation in the lodgepole was decidedly less on the untreated areas adjacent to Unit 3. This was the only unit where it was possible to judge of the effect that the work might have had on adjacent untreated areas. From one half to a mile distant from the outer edge of this unit a decided reduction in the number of the 1911-12 infestation as compared with the red-topped trees of the 1910-11 infestation was noted. Beyond this limit there was no apparent decrease.

The infestation in the lodgepole and also the white bark pine is still tremendously heavy; the shaded uncolored portion on the map covers the affected area.

From careful examinations made on a number of typical lodgepole areas in townships 6 - 7 & 8 S.R. 37 E. where the infestation is specially heavy the writer would judge that at the least calculation 200,000 trees, lodgepole, and white bark pine are infested. This infestation is general between an elevation of 5,000 ft. and 7,000 ft. From Anthony Cr., on the north to Elk Cr., on the south and from the border of the treated area west to the Elk Horn Range, is the heart of the present infestation.

From points of vanatge on Anthony, Antone, North Powder, Rock Creek, the head of Marble and Elk Creek Canyons, large areas of red tops were noted. In the month of September extensive areas were noted on which the 1912-13 infestation had every indication of being just as severe as that of previous years. Judged by color of foliage in the Canyons mentioned no reduction could be observed between the infestation of 1910-11 and that of 1911-12. More infestation was noted in the white bark pine than that of previous seasons.

In the opinion of the writer it will take three more seasons of infestation to destroy the lodgepole in this zone; conditions in this type of timber will then be about the same as those in the northern portion of the forest where 90% of the stand is now standing dead.

On a portion of the area near Bourne, Ore., treated by Camp 5, Unit 3, 45 lodgepole were noted in which the attack of 1911-12 had not been successful, this was the only camp area where unsuccessful attacks were met with. Scattering trees of course were noted where the attack was not successful but not more than is generally met with. No lodgepole pine was noted in which the broods failed to develop. In the yellow pine sapling growth a high per cent would produce no brood, the pupae having died in their pupal cells, this was quite common in the small pine saplings. It is true that very little time could be given to this phase of the subject, at the same time it was always carefully noted whether a brood had emerged from the red top trees or not, and also if the broods found were apparently healthy and like to mature and emerge. Beyond this point little attention could be given to this side of the subject. In this connection it may be stated that there was little difference to be noted between the infestation of 1910-11 that of 1911-12 and what during August and September could be noted in the new infestation of 1912-13, broods were found emerging and attacking healthy green trees with every prospect in view of just as heavy an infestation on the untreated areas, both in the lodgepole and the yellow pine and if anything more in the whitebark pine.